Aesthetic Education Function and Its Application in Mathematics Teaching

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Abstract: There is beauty in mathematics. Mathematical education is the education of the United States. Mathematical education not only has the function of intellectual education, but also has the function of aesthetic education. The basic education stage is the stage in which students discover beauty, love beauty, create beauty, and enjoy beauty. Mathematics teachers should be good at discovering the aesthetic elements of mathematics, grasping the best opportunities in teaching, and exerting the aesthetic education function of mathematics to educate students. Therefore, this paper analyzes the beauty in mathematics teaching, and analyzes the aesthetic education function in mathematics teaching, and designs how to use the aesthetic education function to improve the teaching quality in mathematics teaching.

1. Introduction

When we step into the dynamic and magnificent world of mathematics, the abstraction and application of theory, the rigor of logic and the coordination of structure[1], the symmetry and harmony of form, the richness and profoundness of content, the beauty and peculiarity of methods. Wait, all give people the enjoyment of beauty, the encouragement of beauty, the pursuit of beauty. The simple beauty, harmonious beauty, symmetrical beauty and singular beauty of mathematics, like the beautiful melodies in the music works, will linger and sublimate in people's hearts for a long time. Classroom is the main place for students to acquire knowledge training ability. In today's vigorous implementation of quality education[2], the classroom teaching reform is the new mode for teachers to get out of the traditional teaching mode. Mathematics teachers should fully analyze and understand students and guide students to discover mathematics. Beauty, in order to achieve the purpose of mathematical aesthetic education.

2. The existence of mathematics in the United States

2.1. Simple beauty

Simplicity is one of the essences of beauty. Mathematics uses only ten Arabic numerals and several symbols to draw a magnificent picture. Every concept in mathematics can be said to be the crystallization of people's elaborate carving[3]. Mathematics strives to solve difficult and solve complex problems with the simplest language (text, symbols and graphics), concepts, theories, methods and logical structures. It is simple, clear, clear, easy to understand and gives people a sense of beauty. "The answer to the beauty of the so-called beautiful question in mathematics refers to a simple answer to a difficult and complicated question" (Deddro). Simplicity has almost become a goal of mathematics. In order to avoid repeated additions, multiplication is produced, and the power is another simplification of multiplication; it is the dissatisfaction with Euclidean's fifth public conciseness, which triggers a revolution in geometry; contemporary high-tech Logo—The binary used by the computer is simple to use only 0 and 1 to represent all numbers and languages. The simplicity of mathematics is not simply simple, thin, and elementary. It is to summarize a large number of facts with simple principles and formulas. This simplicity is also far-reaching and shows the beauty of scientific theory. This clearly shows: "The pursuit of simplicity and beauty has led to tremendous advances in mathematics, science and culture."

2.2. Symmetrical beauty

The so-called symmetry refers to the symmetry of the two parts that make up a certain transaction or object, and is a special manifestation of unity. Things that are both relative and proportionate give a sense of beauty[4]. For example, the center symmetry, axis symmetry and mirror symmetry in geometry; the pair of virtual roots of polynomial equations in algebra appear, the matrix representation of linear equations and Clem's law all show symmetry. In mathematics, the geometric concept (including bilateral, rotational and translational symmetry) is directly given to the symmetry beauty, and the essence of symmetry is also grasped--equivalence, and the understanding of one domain is transferred to its equivalent. An area. Such as from number, formula to graph, from addition, multiplication, differentiation to corresponding subtraction, division, integration, from determinant to matrix, to the invariance under the self-phase transformation group of modern element structure. It not only enriches the understanding of symmetry, but also enhances the speed of cognition through the "equivalence transfer" method formed by aesthetics, and plays a role in methodologies for other disciplines and cultures.

2.3. Harmonious beauty

Harmony and beauty are meanings of order, symmetry, proportion and balance. "It is just the right coordination and moderation" (Sikar)[5]. The harmonious beauty of mathematics is manifested in the very compact, regulated and orderly structure of the entire mathematical theory. Such as from natural numbers to integers, rational numbers, real numbers, complex numbers to numbers in any number field; from point, line to face, body graphics, all reflect the harmonious beauty from shallow to deep, from simple to complex. The harmony of mathematics also manifests itself as a unity and unity between the whole and the whole. The intersection chord theorem, the cutting line theorem and the tangent length theorem of plane geometry are also in a very harmonious unity of the circle power theorem. There are elements of harmony and beauty in the series, arrangement, trigonometric function, curve and so on. Another example is the combination of numbers and shapes used in mathematics, that is, the number and shape are harmoniously unified through a Cartesian coordinate system. The potential aesthetic consciousness and strong desire for knowledge are stimulated in the face of the harmonious beauty of mathematics. This is the purpose of mathematics aesthetic education.

2.4. Strange beauty

Singularity is the destruction of harmony or unity in exponential science at a certain stage of development. The emergence of unconventional creation has formed the germination of new ideas, new theories and new methods. It is characterized by novelty, peculiarity and unexpectedness. Strange things can give people a sense of beauty, and the singularity is extremely beautiful. "There is no such thing as a beautiful thing that does not have some singularity in harmony" (Bacon). In the plane geometry, the three triangles are high in one point, which is an indisputable fact. For any triangle, whether the high line is outside the triangle or inside the triangle, they will intersect at one point. In the real field, for example, the exponential function and the trigonometric function are irrelevant, but in the complex domain, they are subtly linked by the Euler's formula eix=cosx+isinx, which makes people sigh with mathematics and a little more[6]. Evocative feelings. It is the strange beauty revealed by these contents that gives students a huge internal drive, guides students' intuition and conjecture, induces, motivates and develops students' thinking, and cultivates and enhances students' innovative ability. This is undoubtedly the goal pursued by mathematics aesthetic education.

3. Aesthetic education function in mathematics teaching

3.1. Smelting function

There is a harmonious beauty between mathematics and nature. As early as in ancient Greece, the Pythagoras school advocated the creed of "everything is worth". In their view, nature is designed

according to mathematical laws, and beauty is harmony. From a mathematical point of view to understand the beauty of nature, and promote rationality into aesthetics. Today's mathematics exerts tremendous power in exploring the mysteries of nature, and it enables people to realize the harmony and mysterious beauty of mathematics and nature, thus inspiring people's fascination with the beauty of nature and enhancing the confidence to explore the mysteries of nature. The study and study of mathematics requires a full imagination. A person who lacks emotion and imagination, nature will appear plain in his eyes. The edification of mathematics makes people truly have a pair of eyes full of emotions. It will experience nature and feel life with full enthusiasm and aesthetic vision.

3.2. Inspiring Intelligence

The beauty in mathematics is the source of stimulating curiosity and forming an internal drive. It is necessary for students to experience the beauty of the form of mathematics in learning, and to make it a rational curiosity and to stimulate the enthusiasm for learning[7]. This kind of enthusiasm is long-lasting. It will affect students' persistent pursuit of science, truth and ideals, longing for good things, and strive for progress; instead of pursuing the success of the entrance examination, once the goal is achieved, the source of motivation It may be exhausted.

3.3. Enjoy the function

"The joy of mathematics can make people forget everything." For those who have already started, mathematics is like a beautiful landscape. They can appreciate the exquisite harmony of numbers and shapes, and enjoy the unexpected prospects and joys of the new discoveries. In real life, people are willing to accept the intellectual challenge. The prevalence of quiz, the hobby of people's strategy games such as chess and cards, although rarely recognized, is essentially a reflection of the mathematical temperament.

3.4. Inspire innovation

Human intelligence is not just a logical-intellectual power. Wisdom associated with emotions not only exists objectively, but also has important social and cultural values[8]. In contemporary education, the logical or rational intelligence as the sole or main measure will inevitably inhibit the normal potential of human beings, and affect the comprehensive realization of developmental functions and the cultivation of talents. Psychologists have found that those who cultivate pure science or simply engage in art in the modern education system often create pain and disharmony for themselves in their creative activities. Aesthetics is an important psychological quality of scientists, and those who lack aesthetics will never become true creators. The beauty in mathematics is the radiance of mathematical truth, illuminating the process of people's pursuit and exploration. Many inventions and creations in science must rely on aesthetics and intuition, and the pursuit of beauty is one of the driving forces of scientific creation. The development of modern science is not to expel beauty and emotion from the scientific field, but to better understand my own self and to understand objective truth more positively and deeply through these factors. As Lenin said: "Without human emotions, there is never and no one can pursue the truth."

4. Mathematics teaching design and application aesthetic education

4.1. Mining mathematics beauty and cultivating sentiment

Aesthetic education in mathematics has the same ideological education function as literature and art. However, mathematics beauty is a high-level form of beauty[9]. For those who lack mathematics literacy, especially the limitations of young people's experience, knowledge and aesthetic ability, it is impossible to feel and realize as easily as literature and art. This requires teachers to continuously improve. Self-level of professional knowledge and aesthetics, carefully study the teaching materials, deeply explore and carefully refine the aesthetic factors contained in the textbooks, create a harmonious, beautiful and pleasant learning environment and atmosphere for students, and guide students to discover beauty and feelings according to the laws of beauty. Beauty, appreciation of

beauty and creation of beauty, aesthetic education, improvement of aesthetic ability, and cultivation of aesthetic consciousness. The core of it is through emotional education, let students open their hearts in the edification of beauty, pursue the truth, goodness and beauty of the objective world with their own knowledge, meaning and emotion, cause spiritual sublimation, generate emotional resonance, and beautify the soul. The effect of purifying the emotions and cultivating the sentimental exercise can also play a positive role in cultivating students' good personality quality and forming their correct outlook on life and perfect world outlook.

4.2.   Creating Mathematical Beauty and Cultivating Thinking Ability

One of the basic tasks of mathematics teaching in primary and secondary schools is to develop students' thinking ability in the process of imparting mathematics knowledge and skills and skills. According to the characteristics of young people's "good thinking" and "good action", in the teaching, the teacher passed a multi-solution (certificate) and a problem[10]. The singular beauty of mathematics such as multi-use, multi-figure, etc. encourages students to think multi-directionally, to make new ideas, and to find the best method. Teachers should be good at grasping the timing of teaching, creating a realm of thinking, and enlightening students' thinking with the power of mathematics. When students feel the most sensitive, strongest and most profound about mathematics, their thinking also enters the best period, logical thinking and inspiration. The integration of thinking is promoted, and the ingenuity is fully exerted. Once "inspiration" appears, they will feel the joy of creating mathematical beauty and the joy of success. Undoubtedly, their thinking ability has also been cultivated and improved.

4.3.   Displaying the beauty of mathematics to stimulate interest in learning

Psychological research shows that compulsory learning without the slightest interest will stifle students' desire to seek truth. Interest is one of the motivations of thinking, and interest is a strong and lasting motivation for learning. Only students who love mathematics can produce positive and lasting learning. Therefore, teachers should make full use of mathematics beauty to induce students' strong interest in learning and strong desire for knowledge. The specific method is as follows:

(1) Introduce mathematical concepts, theorems, and formulas through vivid examples of students' familiar realities and visual aids, and organize students to perform practical operations. Students are exposed to mathematics and daily life. (2) Combining the content of teaching materials, Students introduce the history and progress of mathematics and their extensive application in socialist modernization, so that students can see the usefulness of mathematics, and clarify that today's learning is for tomorrow's application; (3) according to the content of the textbook, often selectively The students introduce some vivid mathematical allusions, anecdotes and Chinese and foreign mathematicians to explore the mysterious story of the kingdom of mathematics thinking; (4) according to the teaching needs and the level of intellectual development of students to put forward some interesting thinking mathematical problems.

4.4.   Converging Mathematical Beauty to Deepen Knowledge Understanding

Mathematical beauty is an advanced form of beauty. It is characterized by an infinitely rich and sensible content in the abstract rational form. In teaching, teachers use a lot of vivid and sensible materials to give students an aesthetic sense of intuition. The abstract and boring mathematical concepts, formulas and theorems are first given to students with a concrete and intuitive image, and then rise to a rational image, which becomes the shape between letters and arithmetic symbols. Art makes students' knowledge and easy to understand. Teachers make aesthetic demonstrations through rigorous reasoning, vivid language, beautiful graphics, scientific blackboards, etc., creating a situation of thinking, integrating the simple unity of mathematics beauty and harmonious symmetry into the whole process of teaching, so that students enjoy the beauty. Gain knowledge, understand knowledge, and master knowledge. Understand the true meaning of mathematical beauty in a subtle way. By guiding students to compare and analyze the knowledge they have learned, summarizing and summarizing, revealing the inner laws, forming an orderly structure system, and teaching the students to summarize the methods and other means to integrate the beauty

of mathematics, which can promote students to further consolidate and deepen their The understanding and application of learning knowledge can also improve the quality of teaching and achieve twice the result with half the effort.

4.5. Trial Mathematical Beauty to Solve Math Problems

The ability of mathematical aesthetic judgment is the ability of aesthetics to distinguish and evaluate aesthetic objects. In the classroom teaching, often exploring the mathematical beauty in the teaching materials and introducing appropriate examples, can greatly improve the students' ability to feel the beauty and appreciate the beauty, and gradually enable the students to achieve the initial ability to use the mathematical methods to create the beauty. For example, in order to introduce the concept of logarithm, the teacher can first guide the students to review the two operations defined by the equation ab=N: a, b is known to be the operation of N - the power; the known N, b is the operation of a - Open the square; and then inspire students to consider the characteristics of mathematical harmony and beauty, there must be another operation: know a, N to find the operation of b - the logarithm. In this way, the task of introducing the concept of logarithm is completed from the shortcomings of making up for the asymmetry of the original knowledge structure. Another example is when deriving the elliptic equation $(a^2 - c^2)x^2 + a^2 y^2 = a^2(a^2 - c^2)$ .Students can be guided to discover: If ordered $a^2 - c^2 = b^2$, then the equation becomes $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ (a>b>0), the equation is simple, harmonious, and beautiful, and a and b are exactly the long and short semi-axes of the ellipse. Long, the letter "b" contains a clear geometric meaning. At this point, the things that the students feel beautiful in the inner world are confirmed in the outside world.

5. Conclusion

In short, the classroom is the main place for students to acquire knowledge training ability. In today's vigorous implementation of quality education, the classroom teaching reform is the new way for teachers to go beyond the traditional teaching mode, taking students as the main body, trying every means to mobilize the internal factors of students and motivate students. Actively participate and turn the classroom into a place created by teachers and students.

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